

Research of CO₂ laser produced Sn and SnO₂ plasma

Lan Hui, Wang Xinbin, Zuo Duluo and Zheng Guang

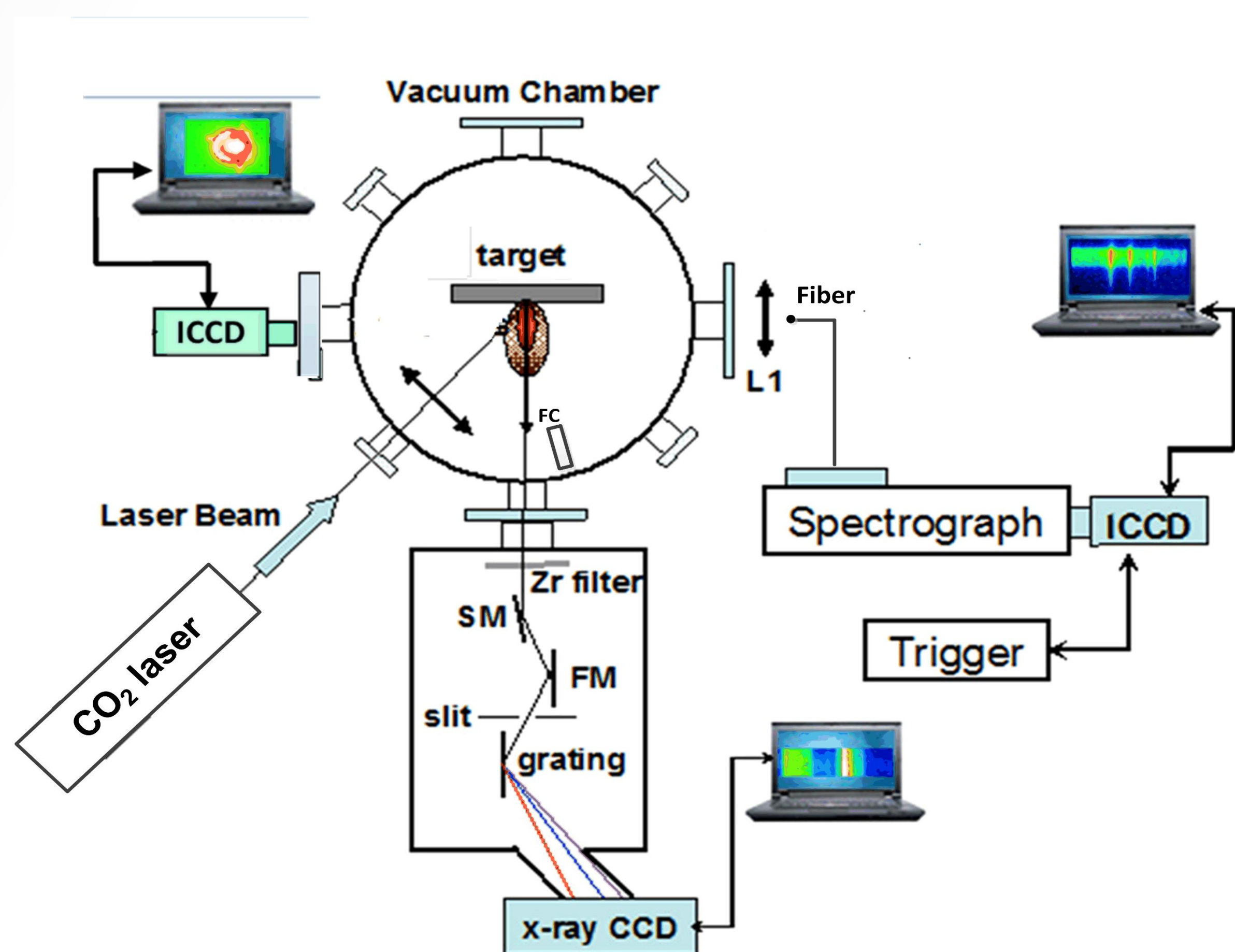
Wuhan National Laboratory for Optoelectronics, Huazhong University of Science and Technology, Wuhan 430074, China

E-mail: xbwang@hust.edu.cn

Introduction

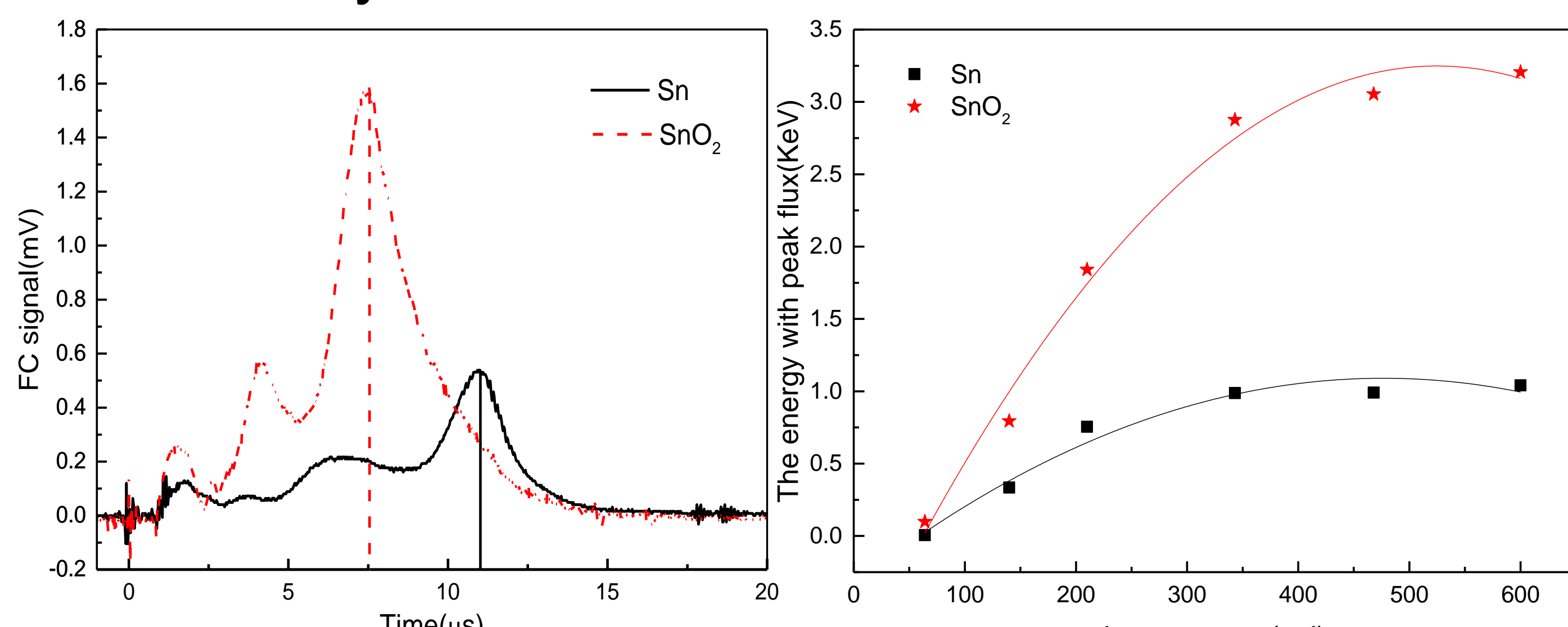
The plasma plume expansion, ion debris and spectroscopic characterization of CO₂ laser produced Sn and SnO₂ plasmas have been investigated under identical experiment conditions by a CO₂ laser with a full width at half maximum of 80 ns. The expansion parameters of LPP are estimated by means of a fast gated ICCD imaging system, while the ion debris was detected using a Faraday cup with the TOF method. Meanwhile, the spectral emission of both plasmas have been investigated using a Princeton spectrograph. Furthermore, the EUV emissions have been measured by a grazing incidence flat-field spectrograph. The ICCD images shows that Sn plasma plume has a hemispherical shape, while a cone shape plasma plume is observed in SnO₂ plasmas. Due to the difference on the thermodynamic parameters of samples, the total amount of ion number and the kinetic energy are both higher for SnO₂ plasma compared with Sn plasma. OES obtained from SnO₂ target shows an obvious higher in the optical emission intensity than that of Sn target. The maximum estimated EUV CE of Sn and SnO₂ plasmas are 1.2% and 0.9%, respectively, due to the lower dense of Sn in SnO₂.

Experimental

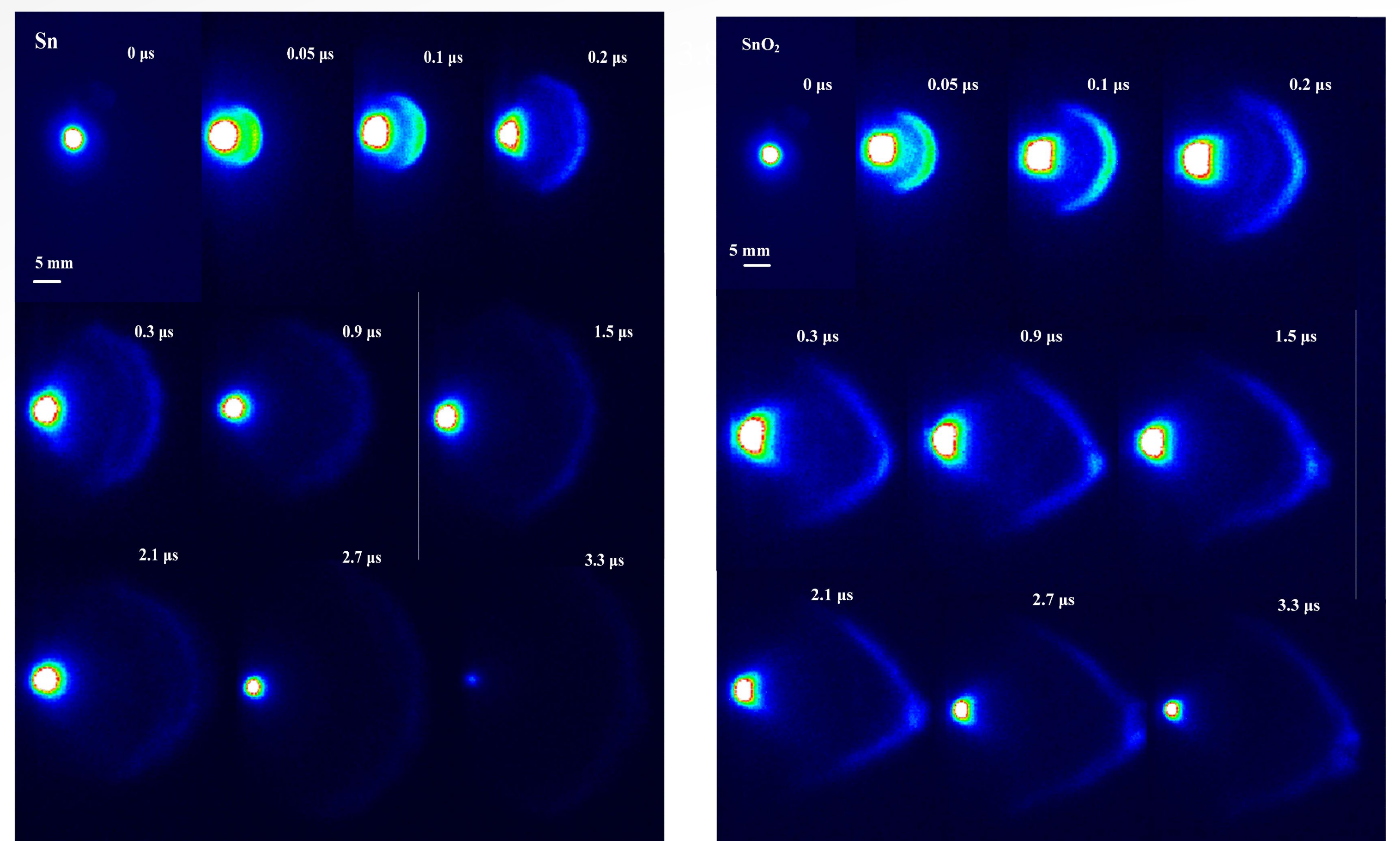


Results and Conclusions

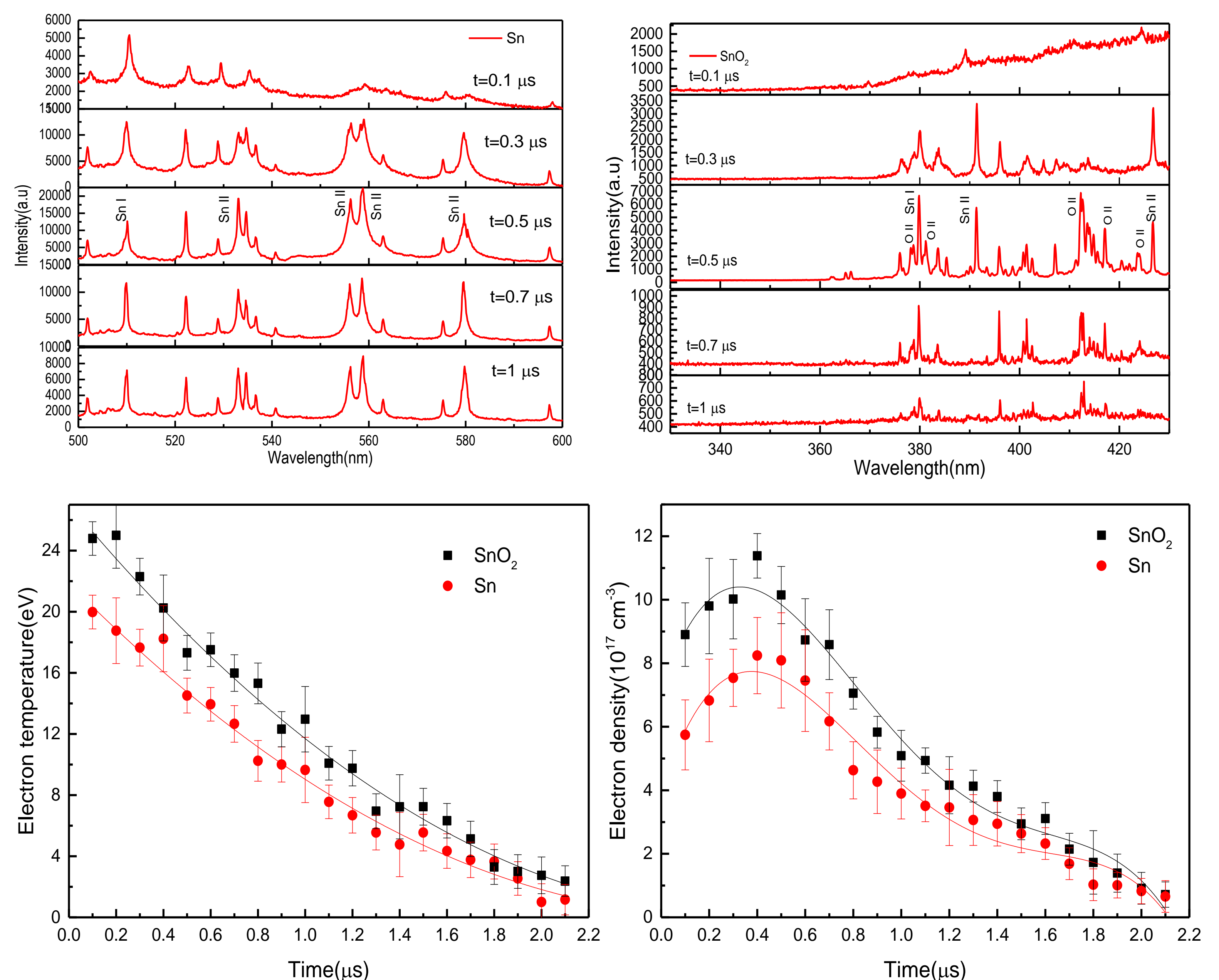
Ion analysis:



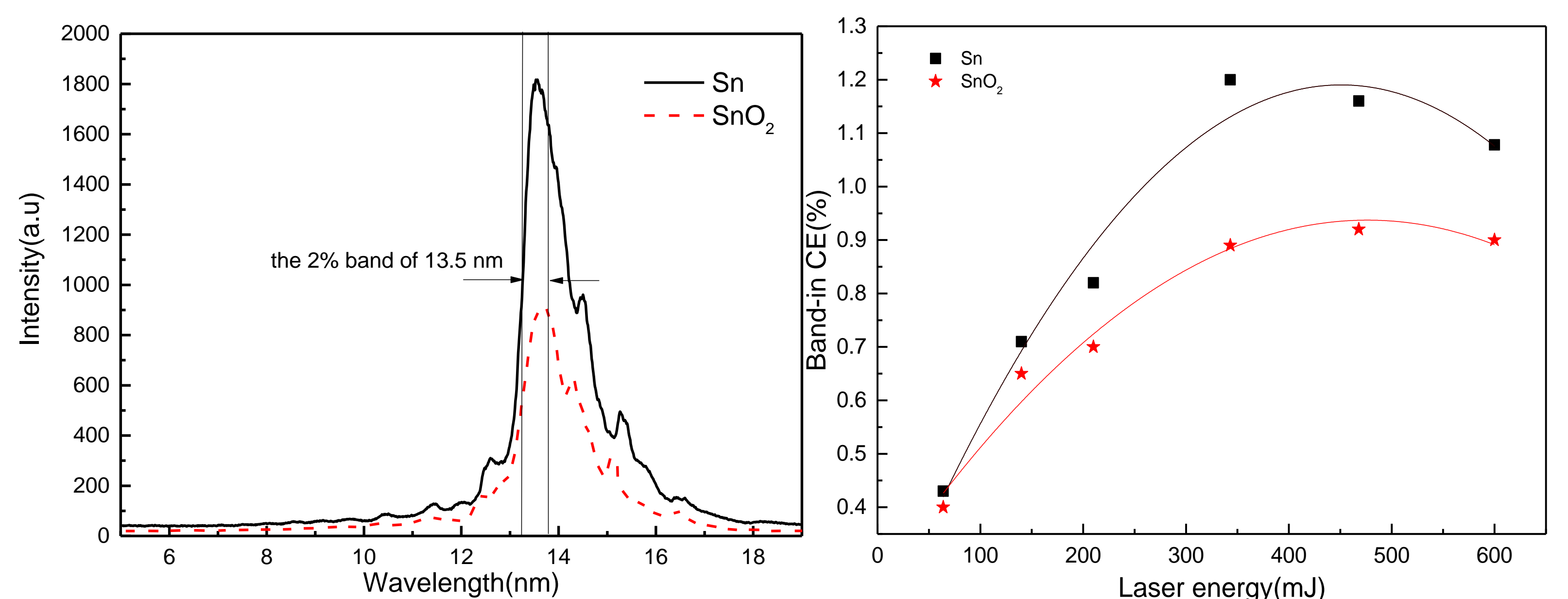
Plume expansion:



Optical emission spectra:



EUV emission



Research supported by Director Fund of WNLO and the National Natural Science Foundation of China under contract No:61575085.